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***Abstract*--Many organizations with an IT infrastructure consisting of a combination of hardware and software, look for ways to achieve greater efficiencies, cost-savings associated with maintenance and upkeep, ease of use, while maintaining a great level of security.**

The main idea behind this research paper is to better understand the decision-making process with respect to how an IT organization evaluates its needs and chooses between different computer-hosting environments, i.e.: public cloud, private cloud, hybrid – combination of public and private cloud, lastly, an in-house platform, which is hosted internal to the organization and/or via a datacenter. A widely-accepted definition of "Cloud Computing" are Applications delivered as services over the Internet AND the hardware and systems software in the data centers that provide those services [1].

I. INTRODUCTION

The project topic is an in-depth analysis of Cloud Computing, the benefits of migrating to a cloud environment and the potential risks/implications involved if moving from a current in-house computing platform to the Cloud. The common classification of different cloud service models are:

- Software-as-a-Service (**SaaS**) is a piece of software made available to customers through the Internet. The application runs on the infrastructure of a cloud provider and is typically accessed by users through a web browser.
- Platform-as-a-Service (**PaaS**) allows for the user to develop applications with the programming languages and tools made available by the platform supplier.
- Infrastructure-as-a-Service (**IaaS**) customers are provided with the capabilities to provision computing resources like processing, storage, and networks. These resources can be used to deploy and develop arbitrary software and the customer is fully responsible for the administration of the operating systems and other software installed [2].

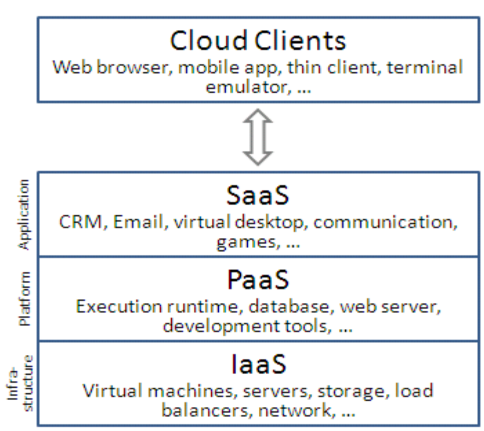


Figure 1: Cloud service model [3]

In order to define the parameters of this research project, and what may constitute success (move to cloud or stay with in-house platform), we employed a three-pronged research approach: Literature Review, Hierarchical Decision Model, and finally, a Technology Acceptance Model.

Putting all of our "research eggs" in one or two baskets may not be sufficient, and could possibly lead to a faulty outcome. By utilizing all three methods, we feel confident in our findings in that we can cross-reference items that are deemed important to the research participants.

II. LITERATURE REVIEW

Literature review primarily serves as an avenue to read about what is already known about a particular problem as well as find out about the opinions of others who have already done some work about the research. According to Fraenkel and Wallen [4], literature review helps to learn about both historical and current studies, find out about new things and also situate ones research within the context of existing research. Cronin, Ryan, and Coughlan [5] also suggest that literature review usually helps get rid of any personal biases, enables gathering of information from several sources, and provides a clear strategy for selecting and structuring the gathered information. One of the goals of research is to advance a field of study by adding, extending, or building on existing research. Literature review enables gaps to be identified in order to fill them. Furthermore, Webster and Watson [6] suggest that literature review enables theoretical development to be put into perspective, close existing gaps, and also identify some other areas where further research is required.

A. Cloud Decision/Adoption

The numerous potential uses of cloud computing continue to drive individuals and organizations to adopt various cloud applications. Nkhoma and Dang [7] developed and validated a theory-based conceptual model to ascertain some drivers of cloud computing. They found among other things that business scalability, cost flexibility, and access to industry expertise are the main drivers of cloud computing adoption. Furthermore, they pointed out the existence of barriers to cloud computing such as compatibility with existing applications, reliability and availability, governance and compliance policies, with cloud security being the main barrier to the adoption. By comparing two different discussions based on industry report and academic research, the authors provided a statistically validated conceptual model for determining cloud computing adoption drivers and barriers.

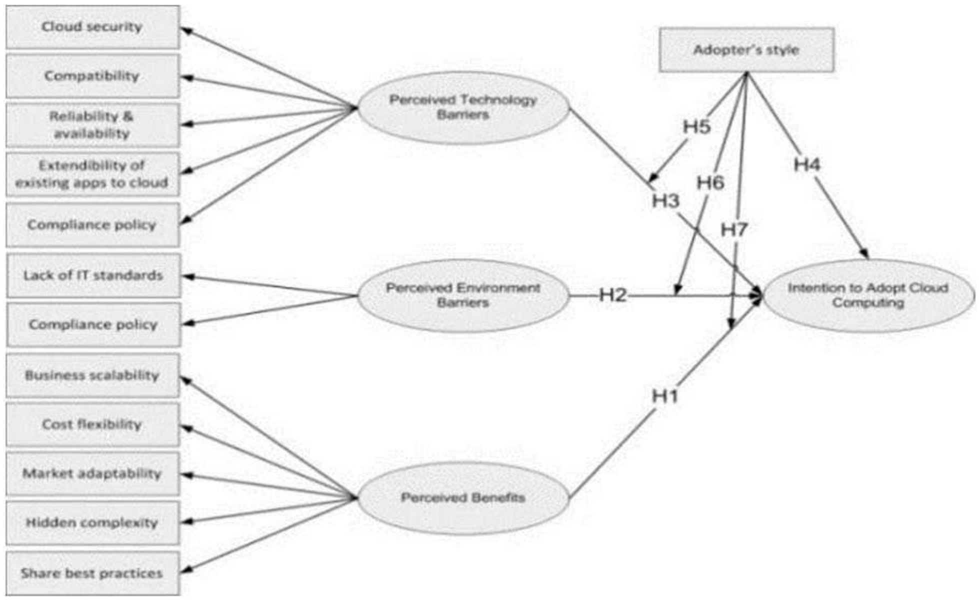


Figure 2: Conceptual model illustrating hypotheses & contributing factors mapping [7]

In a study to investigate the determinants of cloud computing adoption with the UK, Lumsden and Gutierrez [8] found out that aspects relating to compatibility, relative advantage, technology management, and top management support are very influential in cloud computing adoption. While cloud computing have its own advantages, the disadvantages that accompany it tend to dissuade a lot of people or organizations from adopting cloud computing although it has the ability to revolutionize businesses. The 'technology-organization-environment framework' (TOE) which analyzes IT adoption by different firms in different locations provided initial insight of key predictors for cloud adoption after a self-created survey was employed to gather data.

Alshamaila and Papagiannidis [9] studied small to medium-sized enterprises to access how cloud computing could enable them deliver products and services which were originally only possible by large enterprises. Using the Technological, Organizational, and Environmental (TOE) framework as a theoretical base, they developed a multi-perspective framework that showed that relative advantage, uncertainty, geo-restriction, compatibility, innovativeness, market scope, external computing support, among others were some of the factors crucial to cloud adoption. However, they suggest that not enough evidence point to competitive pressure as being a significant factor in determining cloud computing adoption.

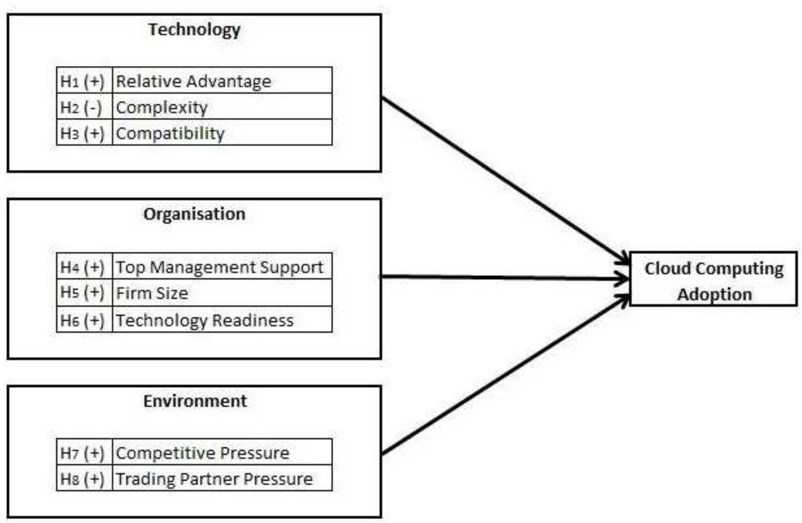


Figure 3: Conceptual model of TOE framework for analyzing cloud adoption [8]

With timeliness increasingly becoming crucial in most business and IT circles, it is imperative for firms to be aware and responsive to competition and the external environment in order to maintain competitiveness. Organizations need to adopt multiple hypothesized relationships, like risk-oriented cultures and normative and coercive pressures in order to increase how timely decisions are made [9]. This will eventually indicate the factors that are most crucial to the adoption of particular innovative products or services. The immense and considerable uncertainty that surrounds migration to cloud computing continues to pose challenges to adoption. While generally security and business continuity concerns remain two of the biggest drivers of this uncertainty [10], understanding the real options to decision making ultimately places firms in a better position to make any migration decision.

B. Cloud service decision tools

The literature review that was conducted for our research used a two-pronged approach in the sense that the review was done around two perspectives, namely the academic perspective and the business perspective. The academic review involved numerous case studies, research briefs, and academic journals. In addition, two courses of the Engineering and Technology Department (Portland State University) namely, Decision Making and Technology Assessment and Acquisition formed the basis on which the Hierarchical Decision Modeling (HDM) and Technology Acceptance Model (TAM) were developed. The literature review with a focus on the business perspective on the other hand used sources ranging from scholarly articles on all aspects of business, management, company profiles, country information, industry reports, national and international newspapers, legal and medical publications, and government documents. Overall, the use of literature review helped in identifying the factors that highly influence cloud adoption, as well as various frameworks for assessing cloud adoption such as the TOE (Technological, Organizational, and Environmental) and the TOP (Technological, Organizational, and Personal).

While the literature review proved very useful, it had its own challenges. Identifying resources and analyzing all those resources in order to put together a relevant summary was time consuming and required some level of skill in certain instances. This therefore put some limitation on the volume of materials that could be reviewed. In addition, since literature review is confined to information about the past, it sometimes does not exactly capture what is currently actually happening. For example, some cloud computing statistics that were identified from the literature proved to be vastly different from current statistics given the dynamic nature of cloud computing and the information technology sphere as a whole. Nonetheless, literature review offers opportunities for synthesizing various research as well as practical values even in the corporate world [11]. Additional information pertaining to the strength and weakness of the literature review will be outlined in the Discussion section.

C. Gap analysis

IDC predicts cloud spending will grow a remarkable 25% in 2014, reaching over $100 billion [12]. Another observation on cloud market is more R&D investment for Cloud Computing. For example, HP will invest more than $1B for Cloud Computing in next two years, despite decrease of R&D 8% last fiscal year to $3.1B. Amazon, Google and Microsoft will spend $1B to $2B a quarter to build data centers (IaaS) [13]. However, According to IDC, top ranking challenges for cloud adoption are Security (87.5%) , Availability(83.3%), and Performance(82.9%), which are based on a survey of 263 IT executives and their colleagues to gauge opinions about IT cloud services [14].

Based on the above the cloud market review together with some challenges and issues identified from relevant articles, several gaps for cloud service adoption may include three aspects including technical, organizational and personal perspectives. For technical perspective, the factors may include Availability, Performance, Security, Reliability, Data Confidentiality, Data Transfer Bottle neck, and Scalability. In terms of organizational perspective, the factors consist of Control, Cost, Standards, Transparency, and Licensing. For personal perspective, the Privacy, Portability, Interoperability should bring customers' attention on the decision of cloud service adoption.

III. RESEARCH METHODOLOGY AND DEVELOPMENT

As previously mentioned, we employed a three-pronged research approach. Before we discuss the final the research methodologies, explained in the forthcoming sections, it is important to understand the way in which we developed this strategy. Most importantly, we wanted to collect data and review research results from different perspectives, hence we wanted to use at least two if not three different research tools. The idea is that we might come across some interesting pieces of information that would not be made available if we only used one or two tools.

Leading off, we knew that Literature Review would be the initial tactic used to gain a deeper understanding of what we really want to accomplish in this study and to identify the best tools to accomplish this. From that standpoint, we were able to evaluate other research tools as a means of collecting and sorting through the volume of data we would soon gather.

The methodologies that rose to the top of our "preferred method / research" list were: Delphi, TOPSIS / HDM, Single-sourced survey instrument, and lastly a Focus Group. Mid-way through this process, we were introduced to another very useful tool known as TAM.

Delphi – we discussed as being one of the better qualitative tools to collect and prioritize results, however due to time constraints identifying industry experts and running two rounds of questionnaires seemed unrealistic. However if we did not have to rely on industry experts, this method might have been pursued.

TOPSIS / HDM – Between using a multi-criteria method to identify a solution vs. pair-wise comparison across an organization hierarchy of "Cloud Drivers", we felt there was too much similarity between the two, and selected HDM, due to familiarity.

Single-sourced survey and Focus Groups were initially discussed, but a combination of time constraints and a potential lack of qualified survey responders, we felt this may not provide valuable research findings.

The final research methodologies deployed (Literature Review, HDM and TAM) will be discussed in the following sections.

IV. HDM METHODOLOGY

Using the Hierarchical Decision Model (HDM) as one of the three prongs of research helped elicit and evaluate subjective judgments of the expert panel. Included is the constant-sum measurement scale (1–99 scale) for comparing two elements [15].

"In this method, two elements are compared with each other at a time. The expert allocates a total of 100 points to the two elements in the proportion of their relative importance to the objective. For example:

- If A is 3 times as important as B, A gets 75 points, B gets 25 points
- If the importance of A and B are the same, both get 50 points. This is the case regardless of whether both are extremely important, mildly important or unimportant.
- If A is ¼ as important as B, A gets 20 points, B gets 80 points" [16].

Results of the expert panel will be discussed in the following section(s).

A. HDM Details & Definitions

In our first attempt at building the HDM, simply put, was not successful. The node comparison, context in which they are compared and any potential future results would not provide significant findings from the researcher's standpoint.

In order to build a reliable HDM, we used consistent information gleaned from the in-depth literature review. We identified key factors, technology requirements, degrees of importance, and how these factors relate to one another – as they relate to "Cloud Computing" or "Non-cloud Infrastructure).

Consistent themes from the literature review comprised of the following topics, as well as how they relate to one another, which then in turn enabled us to build the HDM:

Security: cloud provider to offer data security equal to a data center environment

Availability: guarantee an uptime of at least 99.xx percent

Performance: guaranteed high performance of applications over fast connection

Integration w/IT: mixing/incorporating with current IT infrastructure: services, data and applications

Elasticity: the ability to expand a**nd** contract server utilization at user's discretion

Interoperability: cross platform, cross application and cross vendor support services

Ease of Use: intuitive, easy to learn

Stress: overall reliability in peak demand

Other terms such as "Cost", "Speed" and "Quality of Service" really did not need further explanation for the expert panel, as it was self-evident [17][18].

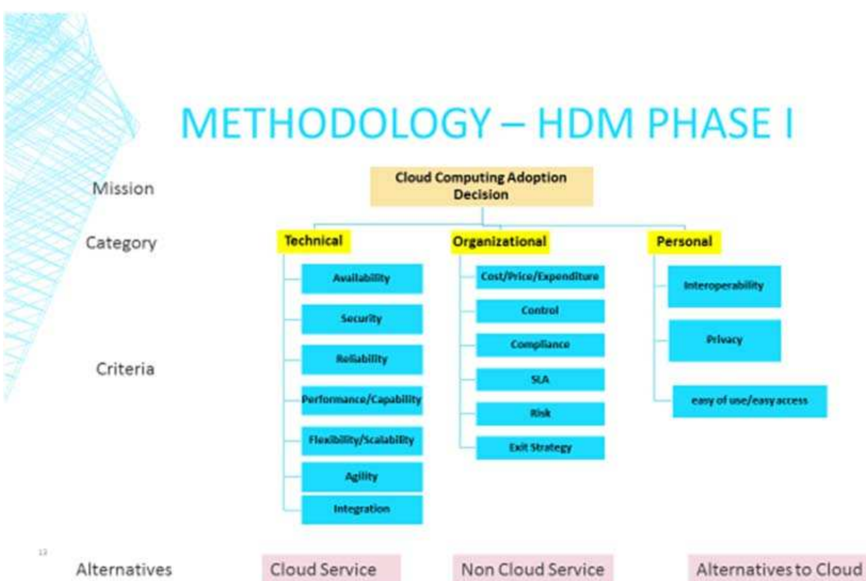


Figure 4: HDM phase I

V. TAM METHODOLOGY

A. Overview of TAM

According to Davis [19], TAM refers to Technology Acceptance Model which "specifies the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using, and actual usage behavior", as depicted in Figure 8. Based on a field study of 112 users, the TAM was proved to fully facilitate the effects of system characteristics on usage behavior of information technology.

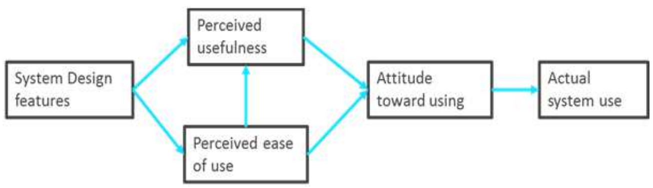


Figure 8: Technology Acceptance Model [19]

B. TAM application case studies

1) Information technology

Ammenwerth et al. [20] reviews the technology acceptance model on IT and finds that previous models fail to include the interaction between user and task. They proposed a FITT framework (Fit between Individuals, Task, and Technology) as depicted in Figure 9. A case study on German University Hospital using questionnaires survey is studied in the paper for illustrating the FITT.

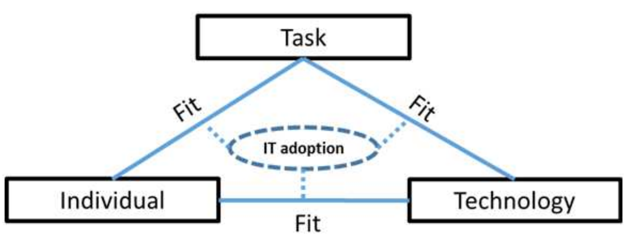


Figure 9: The FITT framework: IT-adoption depends on the fit between individual, task and technology [20].

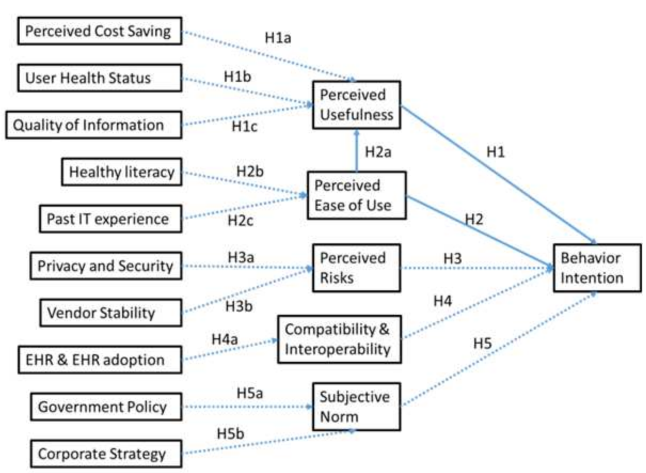


Figure 10: Conceptual model for PHR acceptance [21]

2) Health information systems

T. U. Daim, L. Chan, M. Amer, F. Aldhaban [21] proposes a conceptual model for PHR (Personal Health Record) acceptance. The model formulates several hypothesis indicating the relationship between consumers' intensions toward the technology adoption of PHR as shown in Figure 10. The model is validated by interviewing 3 experts.

3) B2B Cloud Service Adoption

K. –K. Seo [22], studies on Infrastructure as a Service (IaaS) adoption by proposing an extended TAM framework and validated by conducting 250 questionnaire survey in Korea to see the significance of the hypothesized relationship between customers' perception and behavioral intention to use cloud service as depicted in Figure 11.

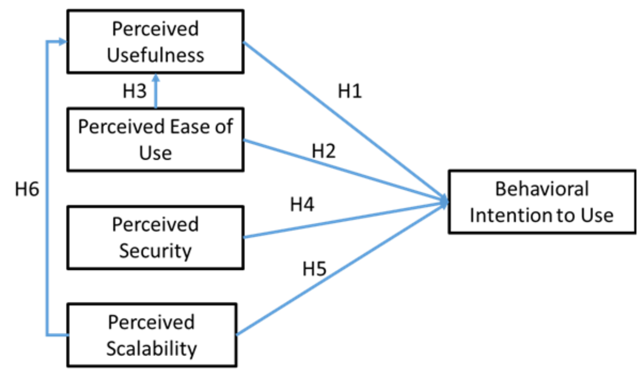


Figure 11: The TAM for B2B Iaas [22]

4) Implications of the TAM literature

Several implications can be made from reviewing the literature and case studies as follows:

- TAM has been widely used to explain and predict the use of Information Systems community.
- Due to some limitation and criticism, TAM has been modified or extended to suit various kinds of technology acceptance cases such as health information system, internet banking, RFID, tablet computer, multimedia learning, mobile service, IaaS cloud service adoption and so forth.
- Questionnaires, Experts Interviews are found to be the major methods used for testing the hypothesis.

C. The proposed Cloud Service TAM

1) Cloud Service TAM

Based on the above implications from literature and case studies, a "Cloud Service TAM" is proposed and depicted in Figure 12, which include the following definitions for each factor.

- Perceived Usefulness: the degree to which a person believes that using a particular system would enhance his or her job performance [23].
- Perceived Ease of Use: the degree to which a person believes that using a particular system would be free from effort [23].

- Perceived Security: the degree to which consumers believe that their information will not be released during transmission and storage by unauthorized parties [24].
- Perceived Scalability: the degree of the system capability to handle a growing amount of work to satisfy customer's requirement in a capable manner [24,25].
- Perceived Availability: the amount of time that a client can make use of a service [25].
- Perceived Performance: the features and functions of the provided service[25]
- Perceived Cost saving: the degree to which a client believes that using a particular service would reduce his or her operating and investment cost [26].

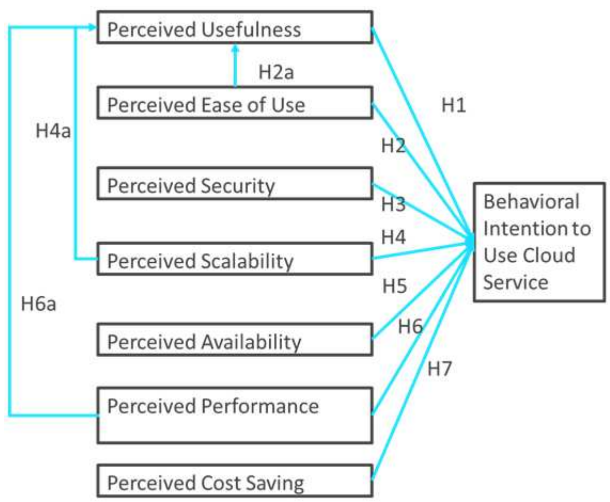


Figure 12: A proposed Cloud Service TAM

2) Hypothesis of Cloud Service TAM

Based on the model developed above, the hypothesis are described as follows and a questionnaire using Qualtrics web tool is developed for gathering the responses from the experts, in order to validate the strength of the agreement on each influential relationship between key factors and intention to use the cloud service.

- H1: The perceived "usefulness" of Cloud Service has significant positive influence on consumers' "behavioral intention to use Cloud Service" [27].
- H2: The perceived "ease of use" of Cloud Service has significant positive influence on consumers' "behavioral intention to use Cloud Service" [28].
- H2a: The perceived "ease of use" of Cloud Service has positive influence on perceived "usefulness" [29].
- H3: Perceived "security" has direct influence on users' behavior intention to use Cloud Service [30].
- H4: Perceived "scalability" has direct influence on users' behavior intention to use Cloud Service [31].
- H4a: Perceived "scalability" has positive influence on perceived "usefulness" of Cloud Service [31].
- H5: Perceived "availability" has direct influence on users' behavior intention to use Cloud Service [32].
- H6: Perceived "performance" has direct influence on users' behavior intention to use Cloud Service [33].
- H6a: Perceived "performance" has positive influence on perceived "usefulness" of Cloud Service [34].
- H7: Perceived "cost saving" has direct influence on users' behavior intention to use Cloud Service [35].

The strength of agreement for each hypothesis is categorized as the following selections including strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5).

3) Experts for conducting Cloud Service TAM survey and interview

Three experts were invited to respond to the Cloud Service TAM and provide some insights regarding the cloud service as a whole and particularly on the content of the Cloud Service TAM.

VI. RESULTS AND DISCUSSION

A. HDM Results

Again, based on the results of the Literature Review, we were able to build the final HDM model, see below.

At the Mission level, we honed our target to encompass "Cloud Drivers", essentially what are the key elements that would prompt someone to take action and select a given cloud solution.

From the Organizational Objective perspective, we selected Integration with IT, Cost and Elasticity. At the Technology Requirements level, the key items were: Interoperability and Exit Strategy – as they relate to Integration with IT, Robustness and Ease-of-Use – as they relate to Cost, and Quality of Service and Speed – as they relate to Elasticity. Finally at the Organizational Priority level, we had our expert panel rank Security, Availability and Performance – as they each relate to the six Technology Requirements.

TABLE 1: THE BACKGROUND OF THE EXPERTS

Experts	Organization	Specialty	industry
1	State University	Computer Engineering, Marketing, Technology Management	IT, Semiconductor
2	Risk Management Company	User Interface developing, Microsoft Hyper-V	medical / hospital
3	Health Solutions Provider	Enterprise Architecture, IT management	Health Care

The reason we grouped all nodes at a certain level, against one another, is that these topics were linked (formally and in-formally) together in the Literature Review portion of our research. In other words, Security, Availability and Performance were discussed in the same vein, not as separate and unique entities.

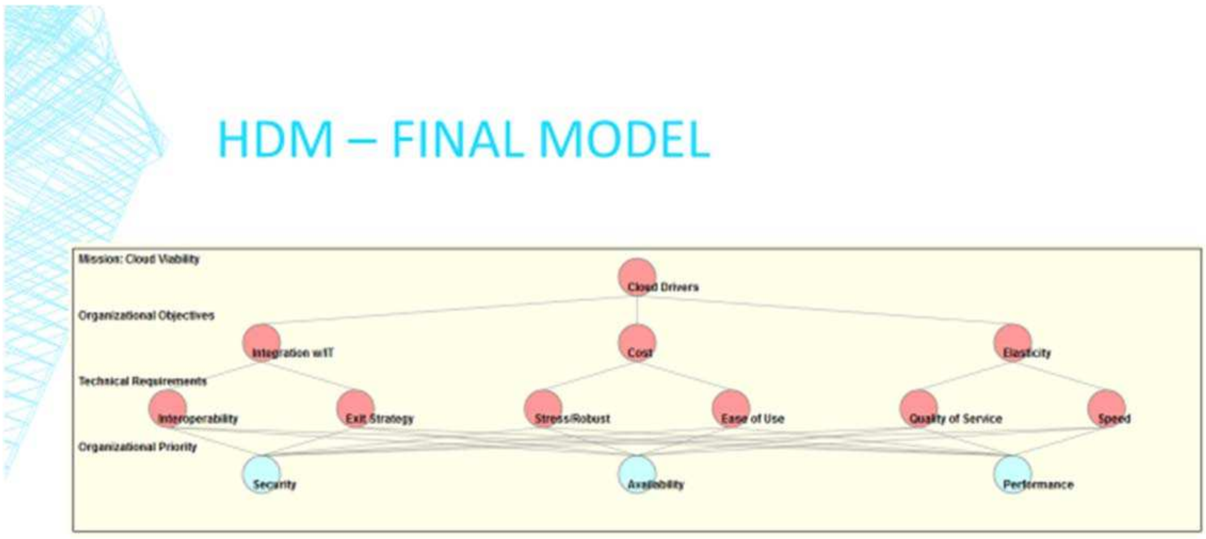
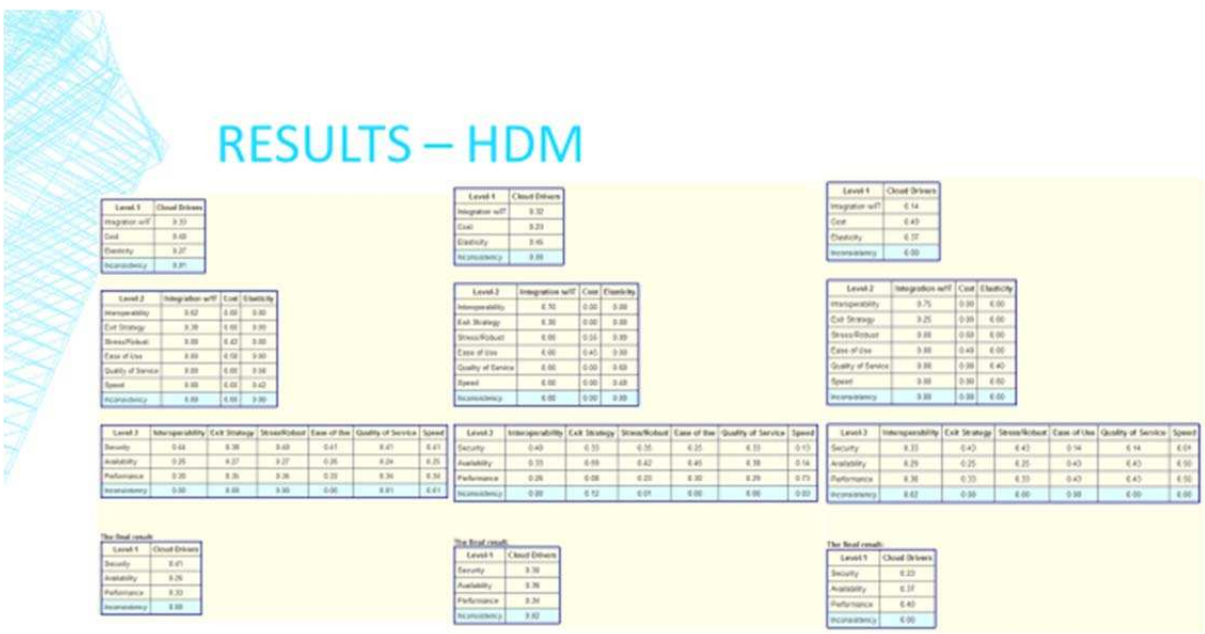
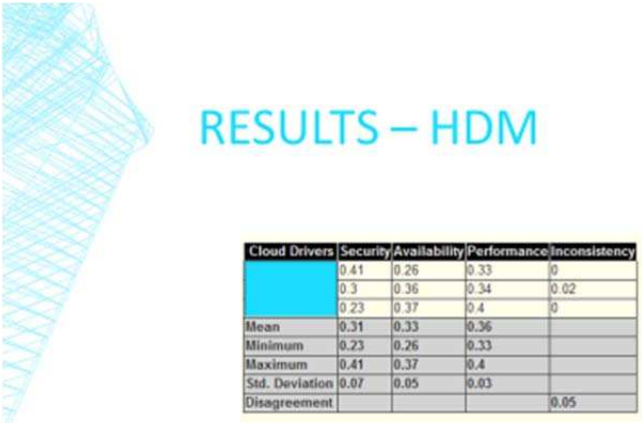


Figure 5: HDM final model



EXPERT 1 **EXPERT 2** **EXPERT 3**

Figure 6: HDM Results for 3 experts



Cloud Drivers	Security	Availability	Performance	Inconsistency
	0.41	0.26	0.33	0
	0.3	0.36	0.34	0.02
	0.23	0.37	0.4	0
Mean	0.31	0.33	0.36	
Minimum	0.23	0.26	0.33	
Maximum	0.41	0.37	0.4	
Std. Deviation	0.07	0.05	0.03	
Disagreement				0.05

Figure 7: HDM result

What the results show is that each expert has identified the primary characteristics that are important to their given firm. Conversely, how each expert defines "Security", "Availability" and "Performance" is unique to each individual. More on the selection process will be discussed in the Conclusion section.

B. TAM results

1) The hypothesis testing results

The experts give the strength of agreement for each hypothesis by either answering the questionnaire on line or during interview, the results are listed as table 2.

Based on the results, the observation can be summarized as follows:

- Top 3 significant agreement on Security (H3), Scalability (H4), and Availability (H5): This means that the experts have strong agreements on the direct influence of perceived security, scalability, and availability on perceived users' behavior intention to use the cloud service.
- Top 1 disagreement on the hypothesis pertaining to perceived Performance's influencing Usefulness. (H6a): This indicates that the experts have significant disagreement on the perceived performance having positive influence on perceived usefulness of cloud service.
- Top 1 diversity (disagreement among the experts) on Cost Saving (H7): This shows that among the three experts, perceived cost saving's having direct influence on users' behavior intention to use cloud service receives the most diverse responses.

2) TAM Results: key findings

Based on the above hypothesis testing results, along with the interviews conducted and email correspondence received from the experts (as shown in Appendix), the key findings are listed as follows:

a. Hypothesis testing results mostly verify the key cloud adoption decision factors.

By showing the degree of agreement and variance, hypothesis testing results can indicate influential factors with significant degree of agreement, which in turn facilitate the selection of the decision criteria. In connection to HDM, security and availability are correspondingly validated, because both received high agreement scores from the experts.

However, performance is partially verified, as seen from the relatively low score on the survey results. The expert argues that the unknown technical specification involve uncertain performance. In addition, the shared resource of public clouds, for example, are likely to reduce their provided performance due to the influence of bandwidth, quality of service, poor configurations and so forth.

b. Strong disagreement between the relationship of performance and usefulness (Hypothesis 6a).

There is strong disagreement as indicated in Hypothesis 6a, "Perceived performance has positive influence on perceived usefulness of Cloud Services". Two experts show strong disagreement on this hypothesis. One expert thinks that usefulness is not a critical issue compared to the other influential factors. The other expert interprets the performance more broadly and argues that "if performance involves technical uncertainty, how we can link it to the usefulness?"

c. Different Interpretation may have significant impact on the hypothesis testing results.

Though the definitions have been provided, some experts feel that the terms used in the TAM model are not of equal weight. Example: one expert strongly suggests that "Agility" should be included in the model and may replace the "Usefulness", because "Quick to Market" is what matters to that expert.

TABLE 2: THE CLOUD SERVICE TAM RESULTS

Experts	H1	H2	H2a	H3	H4	H4a	H5	H6	H6a	H7
1	5	4	4	4	5	5	4	4	4	5
2	3	5	4	5	3	3	5	2	2	1
3	2	2	2	5	5	2	4	4	2	4
Mean	3.33	3.67	3.33	4.67	4.33	3.33	4.33	3.33	2.67	3.33
Variance	2.33	2.33	1.33	0.33	1.33	2.33	0.33	1.33	1.33	4.33
Standard Deviation	1.53	1.53	1.15	0.58	1.15	1.53	0.58	1.15	1.15	2.08

This same expert reiterated that within one company, cloud service adoption may vary depending upon the specific needs and organizational priority. Namely, these diverse interpretation and opinions are mainly attributed to different perceptions of the terms used, industry perspectives, and various kinds of cloud services.

To alleviate this situation, we recommend gathering a larger sample size.

C. Contextual fitness Cloud Service Adoption Decision process

In view of the current environment, the cloud market is surging. However, there are pros and cons regarding the adoption of cloud services as illustrated in Figure 13. The key issues regarding Cloud Service Adoption include security, availability, performance, scalability and so forth. In order to identify the organizational priorities for adopting cloud services, literature review, Hierarchical Decision Making (HDM), and Technology Acceptance Model (TAM) are proposed to be used as research complements for this project.

Based on the literature review and industry expert interviews, the cloud service adoption decision is more likely to be unique to the individual needs and requirements. Therefore, the specific organizational needs are paramount during the decision-making process. In view of this concept, a "contextual fitness based cloud service decision process" is proposed to meet the unique and situational requirements for cloud service adoption decision as depicted in Figure 14. TAM and HDM can serve as complementary approaches to facilitate cloud service adoption by means of validating the degree of agreement and identifying the organizational priorities respectively.

PUBLIC CLOUD	
PROS	CONS
Focus more on your business, not on managing data centers Develop new applications faster Leverage cloud provider's API can automate many operational tasks Cloud computing is scalable	Performance on shared infrastructure can be inconsistent People believe that cloud infrastructure is not secure. Cloud computing may not be the right fit for all workloads

PRIVATE CLOUD	
PROS	CONS
Greater level of security more control over the server 'cloud bursting' non-sensitive data is switched to a public cloud to free up private cloud space	Higher initial outlay [cost] more difficult to access the data held in a private. Cost of setting up private cloud services may prove to be cost prohibitive.

HYBRID CLOUD	
PROS	CONS
Cost Savings Virtualization to reduce costs, improve efficiencies & accelerate value Segregate costs of hardware, software purchases, and costs of using cloud services for specific tasks: backup, archiving, disaster recovery. Improved Productivity Virtual environments like hybrid allow orgs to put workloads and data wherever required to help improve overall efficiency	Security concerns by far the major reason why organizations aren't jumping into the hybrid cloud. Worries that hybrid cloud wouldn't meet business requirements, stringent government regulations and high cost Hybrid cloud still has some ground to cover to be readily accepted in the corporate culture.

Figure 13: The pros and cons of the Cloud Services [36][37][38]

Figure 14: A proposed Contextual fitness Cloud Service Adoption Decision process

VII. CONCLUSION

The choice to adopt or acquire particular technologies or concepts, if not done properly and within the appropriate context, can sometimes come at a cost and cause a lot of unforeseen problems. For example, Basoglu, Daim, and Kerimoglu [39] suggest that defining a framework for projects such as the organizational adoption of Enterprise Resource Planning (ERP) systems will go a long way to address failure factors such as inadequate adoption and implementation failures. According to Daim, Bhatla, and Mansour[40], IT infrastructure such as data centers (DCs) usually require huge amounts of investments, not to mention the time required to put up some of these centers. The use of multi-criteria models such as the HDM can therefore prove useful to firms in making the right decisions given that companies usually have to deal with the ramifications of their decisions for several years.

While cloud service business models continue to emerge and evolve, it should be noted that there are pros and cons associated with the application of any particular cloud model within any specific company. While there is no one solution that fits all, cloud service adoption needs to be done within a contextual fitness that is unique and meets the situational requirements of the particular company that seeks to adopt a particular cloud strategy. In this regard, decision making theories and models such as the HDM and TAM may be used as complementary approaches to facilitate the cloud adoption decision. Furthermore, TAM in particular, can be integrated with other broader models with more expansive variables to help relate better to human and social change processes as well as the general adoption of innovation [41].

Finally, in order to deploy a Cloud Service Adoption Decision at a commercial level, we recommend utilizing a two-pronged approach:

1) Using a larger sample size for both HDM and TAM. In doing so, the "user" can base their cloud adoption decision on a statistically valid data set.
2) Again, using a larger sample size as stated above, create unique sub-sets that focus within a given industry or sector. In other words, have a unique TAM and HDM for a particular industry or sector, i.e.: the Energy sector, Heath Care,

Transportation, Communications, etc. Example, each sector may have 20 + unique experts per HDM and TAM. By doing both steps, the user can base their decision on highly accurate and targeted data.

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APPENDIX I: EXPERT INTERVIEW/EMAIL RESPONSE NOTES

Expert 1:
Date and Time: Nov. 26, 2014
Key points from interview:

- The terms used in this cloud service TAM questionnaire is not that differentiated enough for responder to select their choice. This lead to taking more time to do the survey.
- It seems that no surprising questions included in the questionnaire, which may look not that interesting to the responders.
- Cost is a major factors regarding the cloud service adoption decision, because no huge amount of investment needed on the infrastructure.
- Scalability and usefulness are also considered critical for cloud service adoption decision.
- If questionnaire can incorporate the demographic information, more detailed analysis of the response can be made accordingly.

Expert 2:
Date and Time: Dec. 4, 2014
Key points from email correspondence:

- Q8. H6: Perceived "performance" has direct influence on users' behavior intention to use Cloud Service.
  - I disagree with because 'cloud services' utilize companies own equipment and many time these technical specifications are unknown. Another aspect in cloud services like public clouds services are shared resources with other users. The more users who are utilizing clouds services the more resources are distributed with reduce performance or capped performance. Performance are also affected by the user-end from bandwidth, quality of service, poor configurations, intentional server and non-intentional server downtimes.
  - Technically, measuring performance is difficult to factor with unknown constraints, measurements, specifications, and what configuration is sufficient that meets the performance for users' needs and for what determining standards measurements are being looked upon. Cloud services rarely provides such data. I think with this vagueness, I don't think it can 'directly' influence user's intention to use cloud services.

- Q9. H6a: Perceived "performance" has positive influence on perceived "usefulness" of Cloud Service

- I am not exactly sure how performance can fit with usefulness. It comes whether cloud service works that meets the needs or doesn't meet the needs. Assuming users are expecting the services to work or can get it to work, in that case the services is useful, since it is being utilized, for that to happen some kind of performance has to be there.
- But the focus is on performance. Slow performance are not desirable and fast performance is desirable. Since performance can be slower and lower than perceived expectation. I disagree because slow performance may happen and will mostly not have a positive influence on the cloud services or to its usefulness.

- Q10. H7: Perceived "cost saving" has direct influence on users' behavior intention to use Cloud Service.-
  - So, if it was perceived “COST” has direct influence on users' behavior intention to use Cloud Service. My answer would have been the opposite. But I disagree with ‘Cost Saving’ because for the last 6 years is not that cost saving, although it did go down significantly in the last year.
  - What I know about cloud has ‘hidden cost’ that can add up to quite a large sum. I think many cloud services comes as a pay per usage, or pay per hours, upgrade fees, bandwidth, and in addition to base pay. Adding all of the cost and fees per month in a year or more, it is quite costly. When comparing the cost from apples to apples, I think cloud services adds up at higher cost for now.
  - My answer is from directly comparing it to cloud competing alternatives and the technology that comes with it. I perceived cloud as much higher cost with limited technical specification than the available alternative and this influence me to not have the intention of using cloud services in a long term and frequent usage and from what I know that is why I disagree.
  - I do think it is cost saving at short term with occasional usage compared to buying a servers, but not as intensive every day, high capacity, and high bandwidth.

Expert 3:
Date and Time: Dec. 4, 2014
Key points from interview:

- Cloud service include SaaS, PaaS, IaaS. For SaaS, the example will be Salesforce.com. PaaS can deliver for web application support. The example of Iaas may include the Rackspace which provide Cloud Servers and Dedicated Servers services.
- There are other kinds of cloud services such as Desktop as a service and Backup as a service.
- For PaaS, they are mostly public cloud. For private cloud similar idea, a service called On Premise needs to be distinguished.
- Top priority consideration for adopting a cloud service is “Agility”, which may substitute the “usefulness”, because the “Quick to Market” is what matters to the company which need the service desperately.
- Usefulness and ease of use are considered less or even least important to the cloud service decision.
- For health business, security is the most critical thing. For personal health record, in house will be the best options, due to security consideration. For payroll or CRM, the public cloud may be an options.
- Generally, the requirement of availability is 99.999%.
- Performance is not regarded to have direct influence on the usefulness.

Appendix II: Strength and Weakness of the research methodologies:

For ease of comparison across the three research methodologies, the following lists the strengths and weaknesses of each:

Table 3: Strength of the methodologies [16][42][43][44][45][46]

+++ STRENGTHS +++		
LITERATURE REVIEW	**T.A.M.**	**H.D.M.**
1. Plethora of articles, journals, newspapers and blogs depicting cloud services. 2. Information highly searchable, and somewhat easy to prioritize. 3. Due to the speed at which cloud services have evolved, the Lit. Rev. can be analyzed by date range. This enabled our team to focus on articles/journals that are "fresher" perhaps more relevant.	1. Easy for experts to understand concepts behind: Perceived Usefulness, Ease-of-Use, Security, Scalability, Availability, Performance and Cost Savings. 2. Based on their understanding, they could easily answer our multi-hypothesis questionnaire. 3. Great tool for qualitative analysis. Gives us the opportunity to not only ask questions, but to go back to the experts if additional clarification is needed.	1. Somewhat difficult to architect. This is actually a plus, because the quality of the output is reflective of the model itself. We generated approx. 8 renditions before finalizing our model. 2. Experts were introduced to the 4 unique levels (Mission, Org. Objectives, Tech. Requirements and Org. Priority). Then within each level, experts could easily rank the importance of any two Cloud impact factors. 3. The results of the HDM are straightforward. This, coupled with the "Pros & Cons" of Cloud service options, makes it easier for the expert to identify the best Cloud option that meets their unique / specific needs.

Table 4: Weakness of the methodologies [47][48][49]

--- WEAKNESS ---		
LITERATURE REVIEW	**T.A.M.**	**H.D.M.**
1. Perhaps too many articles to choose from. Because it's a relatively new technology, there is a large increase in the recent volume of work published. 2. Some information gleaned was more from someone's individual perspective, not necessarily hard / well-research facts. 3. How to prioritize? Can't be solely on most recent. It has to be balanced out by quality of expert giving feedback, along with the organization that published it.	1. Due to the limited number of TAM experts, we must base our findings on a somewhat fuzzy perspective. 2. Ideally we would have multiple expert input making our findings both qualitative and quantitate, essentially more statistically valid. 3. Further, having more expert input would enable us to run cross-tabulations, i.e.: comparing responses from experts that have a similar organizational profile. 4. Finally, time constraints makes it difficult to rely solely on a single instance of the TAM. Ideally, we would go back to the experts after they completed the 1st round, asking more probing to generate more qualitative data.	1. Experts gave slight differences in priority or preference. Example: a pair-wise comparison of 52 to 48 does not reflect strong opinions one way or the other, both represent almost equal importance. 2. By this time, we're running out of industry experts to interview, as we did not want to overload our expert panel from TAM with multiple requests. 3. Again, would like to have multiple expert opinions, giving greater insight as to what is important – hence not statistically valid data. 4. Ideally we would have used two different HDM models: one focusing on the CIO/CTO perspective, the other from the individual customer perspective, both containing slightly different nodes.